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TITLE: Lossless transform coding
system having compatibility
with lossy coding

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INVENTOR-INFORMATION:

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JP	8-222188	August
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US-CL-CURRENT: 382/250, 375/240.2 , 708/402

ABSTRACT:

A reversible eight-element discrete cosine transform coding system which provides transform values near to transform values of the original eight-element discrete cosine transform. In a 4.times.4 matrix transform which

appears when an eight-element discrete cosine transform is decomposed in accordance with a fast calculation method, transform coefficients (X1, X7, X3, X5) are separated into (X1, X7) and (X3, X5), which are quantized individually making use of the fact that, if (X1, X7) are determined, then values which can be taken by (X3, X5) are limited. (X1, X7) are quantized with step sizes k1, k7 by linear quantizers to obtain quantization values (Xq1, Xq7). Meanwhile, (X3, X5) are divided into global signals and local signals, and the global signals are quantized with step sizes L3, L5 by linear quantizers while quantization values of the local signals are determined using a table. The quantization values are added by adders to obtain quantization values (Xq3, Xq5) of (X3, X5). The reversible transform quantization for a 4.times.4 matrix and conventional reversible quantization of 2.times.2 matrices are combined to construct a reversible eight-element discrete cosine transform system.

12 Claims, 65 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 56

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Brief Summary Text - BSTX (6):

While the discrete cosine transform is useful for realization of high compression coding, since the base of the transform

is a real number, it is disadvantageous in that, in order to realize reversible coding, the quantization step size must be small, which results in deterioration of the coding efficiency.

Brief Summary Text - BSTX (43):

In order to attain the objects described above, according to a first aspect of the present invention, there is provided a reversible transform coding system which quantizes an original signal using a reversible transformer which effects reversible discrete cosine transform and wherein the reversible transformer reversibly transforms an integer four-element vector (u4, u5, u6, u7) of the original signal into quantization values (Xq1, Xq7, Xq3, Xq5), the reversible transformer including means for linearly transforming the integer four-element vector (u4, u5, u6, u7) with the 4.times.4 integer matrix of the expression (16) to obtain transform coefficients (X1, X7, X3, X5), means for linearly quantizing the transform coefficients X1, X7 with step sizes of natural numbers k1, k7 to obtain quantization values Xq1, Xq7 and quantization residuals r1, r7, respectively, means for determining representative elements (s3, s5) from a first numeric table using the transform coefficients (X1, X7) or the transform coefficients (X3, X5), means for subtracting the representative elements (s3, s5) from the transform coefficients (X3, X5) to calculate global signals (p3, p5), means for

linearly quantizing components p_3 , p_5 of the global signals (p_3 , p_5) with step sizes of real numbers L_3 , L_5 to obtain global quantization values p_{q3} , p_{q5} , respectively, means for determining local quantization values (s_{q3} , s_{q5}) from the quantization residuals (r_1 , r_7) based on a second numeric table, and means for adding the local quantization values (s_{q3} , s_{q5}) to the global quantization values (p_{q3} , p_{q5}) to obtain quantization values (X_{q3} , X_{q5}) and supplying the quantization values (X_{q3} , X_{q5}) as quantization values for the transform coefficients (X_3 , X_5).

Brief Summary Text - BSTX (48):

The means for calculating global signal candidates ($p_3.\text{sup}(.0.)$, $p_5.\text{sup}(.0.)$) from the quantization values (X_{q3} , X_{q5}) may include means for multiplying the quantization values X_{q3} , X_{q5} by the real numbers L_3 , L_5 to obtain quantization representative values ($X_{q3}L_3$, $X_{q5}L_5$), respectively, means for transforming the quantization representative values ($X_{q3}L_3$, $X_{q5}L_5$) with an inverse matrix to the matrix of the expression (19) represented using g , h which are given, from integers a_1 , a_3 , a_5 , a_7 , by $g = a_1.\text{sup}.2 - a_7.\text{sup}.2 + 2a_3a_5$, $h = a_3.\text{sup}.2 - a_5.\text{sup}.2 + 2a_1a_7$, respectively, to obtain inverse transform points (w_3 , w_5), means for raising fractions of the inverse transform points w_3 , w_5 to unit or discarding fractions of the inverse transform points w_3 , w_5 to convert the inverse transform points w_3 , w_5 into integers w_3' , w_5' , and means for transforming a vector (w_3' , w_5') composed of the

integers w_3' , w_5' with the
matrix of the expression (19) to obtain the global
signal candidates
($p_3.\text{sup}(.0.)$, $p_5.\text{sup}(.0.)$).

Current US Cross Reference Classification - CCXR

(1):

375/240.2